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Some Questions for Engineers

By E. A. HITCHCOCK, *Dean of College of Engineering*

"Success," some one has said, "is the most sought of anything else in the world. Often success is not attained because there is so much stumbling over important rules governing its attainment. One excellent rule is—'Plan your work and then work your plan.' Planning is thinking, analyzing, systematizing." Since an engineer's life is, as a rule, a successful one, it is pertinent to ask ourselves several leading questions.

1. How often have we asked ourselves, "Why do we go to the Ohio State University? Why did we enter the College of Engineering? Why did we enter the Civil or the Mining or the Mechanical or the Electrical engineering course in that college?" Can we answer these questions so that there is no doubt in our minds as to the field in which we have entered and in which we are to use our best efforts, produce our greatest, most useful results? Must we state that lines of least resistance were followed, that we were poorly advised by parents, teachers or employer with the result that we entered a field in which we had little natural aptitude? Again, possibly we have simply drifted into engineering by following our high school friends. They may have a definiteness of purpose, but we have simply drifted along with them because we wished to continue in their company. It was much easier; it was following the lines of least resistance.

2. Why do so many students, particularly during the first and second year, question the content of the engineering courses? Why are they unable to fully satisfy themselves as to the value of the required work in fitting them eventually to become engineers? Some fifteen years ago a student, who is now a successful graduate of the engineering college and who is connected with a manufacturing company in an Ohio city, entered the office of President Thompson and asked to register as a special student so that he might take only those subjects which he believed were necessary for his career as an engineer. The President, however, told him that the engineering courses of Ohio State University were planned by engineers who knew by years of experience what the engineering student needed. His advice to this young man was to start in and take what was laid down, complete the course and graduate. The student took his advice and to this attributes his present standing in the engineering field and in the community.

3. Why is it that so many engineering students believe they will like engineering although they have very little conception of what it is and know nothing of the hard and difficult work they must go through in order to become engineers? Because a young man is good in mathematics and science, it does not necessarily follow that he is fitted for the engineering profession. One afternoon during the past summer a young man called at the office of the engineering college fully intent upon entering an engineering course. His reason for the selection was that he believed the field to be a promising one. He felt sure of success because he had always been successful with whatever he had undertaken. After a two-hour conference he concluded, however, that engineering was not for him, that his natural aptitude was in the field of veterinary medicine.

4. Why will some students, after continuing in one certain engineering course for one, two or even three years, conclude that they should follow some other engineering course, or even decide they are in the wrong college? Is it because their ideas as to the necessary qualifications for an engineer were very hazy and that after a time they found that the content of the prescribed course of study was not to their liking and that, although they could master it, they had no relish for it? Fortunately, only a comparatively few continue indefinitely in an uncongenial course. Usually, after a fair trial, most "see light of day," act quickly, get started right and continue their studies with interest and enthusiasm.

5. Why is it that engineering freshmen, sophomores, juniors, yes even seniors, sometimes seem to convey to instructors the impression that they fully understand the demonstration upon the blackboard in mathematics or mechanics, or on the desk in chemistry or physics? True, many believe at the time they do understand, but they discover, a few hours later out of that particular atmosphere, that the demonstration is very far from clear. The problem, in fact, is extremely vague. As a result, they are compelled to spend much valuable time in clearing up some points which might quickly have been made plain by the use of the word *why*, followed, of course, by the instructor's responsiveness. Sometimes, it would seem that if in our classes there were certain days set aside for the asking of questions of the instructors, there would be for the student much less floundering. Because the "merit" man in the class indicates he understands is no reason why the average man should be held back, keep quiet, and not get what he is spending his valuable time to acquire.

6. Why is it that some engineering students are always pleased when an instructor does not "show up," is to be absent for a day or two, or when an unexpected holiday comes along? It is estimated that the average cost of educating a student in our universities at present prices, is $550 per year. To this must be added the value of the student's time and his expenditures for the year. Therefore, rather than feeling pleased at being deprived of some of his work, he should feel he is not getting "value received." When such times come, he should use his time in a way that will compensate for that something apparently lost. In other words, the student possesses an individual power plant, absolutely under his control. This plant of his is capable of a certain maximum, economical load. He is paying the operating costs of that plant; therefore, the

unit cost of useful accomplishment should be kept as low as is wise, by running that plant at a high load factor. To maintain a good load factor, it is necessary, when one kind of load goes off for a day or two, another load should be put on in its place. This power plant of ours, in a lifetime, is capable of a certain gross useful effort. We may think that by extra labor for a short time, we can make up what was lost but in that we are wrong, A loss can never be recovered.

7. Why is it that a graduate engineer after securing a position soon becomes dissatisfied if he cannot at once see the application to the work in hand of what he has just had in college? Too soon he begins to look around and if there is an opportunity at an even slightly increased salary and the work is somewhat of university character, in a laboratory for instance, he sacrifices a position which offers greater future opportunity for immediate larger salary only. This action must be due either to lack of stability or to uncertainty as to his natural aptitude. It indicates a floundering around to find the right place. Sometimes this floundering around, altho it "gathers no moss," does have a great polishing effect, grinds down the high spots and irregularities in a man's make-up so that he drops into some place and becomes an important part of an organization. Much time, however, has been lost in the meanwhile.

8. Why, at the close of the senior year, when several opportunities in different fields for employment are open, does our graduate waver between a position of greater compensation in a field of less interest to him, and a position of less compensation in the line for which he has been preparing? In other words, why does he consider sacrificing opportunity for an apparently momentary advantage which may only be temporary? And the strong chance is that the opportunity is temporary, for it is reasonable to assume that where there is lack of opportunity which should mean everything to a young engineer there must be come other compensation. The writer cannot refrain from relating one incident with which he came in personal contact. A graduate of a very good technical school after having unsatisfactory employment during his first summer after graduation was finally accepted by a manufacturing company with the promise on his part that he would "stick," and put in training for a managerial position. After about six weeks he could not resist the offer to go with a company on the stage as he has musical ability. The high salary appealed to him. He figured that after about two years in this work he would have accumulated so much that he could then afford to continue his engineering experience. Maybe he chose wisely but we very much doubt it—assuming, of course, that he had the proper adaptability for an engineer. And this question also arises: if his field was musical, why did he spend four years in the study of engineering? It is possible he was advised wrongly; consequently when the test came and he was entirely free to make a decision, his natural inclination toward engineering was not strong enough to hold him regardless of inducements in other directions.

7. Why is it that some engineering graduates as soon as they enter the employ of some company feel called upon to attempt to suggest or revolutionize methods which have been in vogue for years? A few days ago an engineering graduate of this institution of some twenty-five years standing, and of large and varied engineering practice, called at the office of the College of Engineering. In relating his experience with engi-

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neering graduates he stated that there was a tendency for graduates from certain institutions not to understand that the theories they have been taught can not immediately displace well established practical systems. For systems which are well established and have been in use for years cannot with economy be thrown out and other new ones installed just because they have been successful elsewhere. In fact, conditions are often very different. This experienced engineer called graduates with revolutionizing ideas "nuisances."

He also related how a recent engineering graduate—not of Ohio State University—was first assigned to work with a surveying party. The first morning the young man appeared with a hand book in one pocket, another hand book under his arm and a slide rule in his breast pocket. The boss of the party to whom the prospective engineer reported, upon noticing his equipment immediately gruffly ordered him to "put away all that paraphernalia and *get an axe*."

An acquaintance was describing recently his visit to one of the large eastern cement mills. As he was being shown through a mill, his attention was attracted to a workman lying on the floor on his back underneath a large piece of apparatus, goggles protecting his eyes, his face covered with dust. He was apparently watching intently some particular part of the operation of this equipment. The visitor remarked to his guide that certainly that man had an unenviable "job." The guide's comment was: "Do you know who that is?"

"Why no," replied my acquaintance.

"Well, that man is Edison. He wants to see for himself."

This incident illustrates excellently well how one of the greatest investigators and engineers of this age, learns *why?*

If we can answer these several pertinent questions affirmatively and have loyalty, industry, determination and enthusiasm we need have no fear as to our success as engineers.